

What Is Claimed Is:

1. A method for producing lipids comprising:
 - a) growing microorganisms of the order Thraustochytriales in a fermentation medium; and
 - 5 b) extracting lipids from said microorganisms, wherein said microorganisms have exponential growth rates of at least about 5.5 doublings per day when grown under the following conditions: exponential phase of growth in M-5 media at 25°C in a flask on an orbital shaker.
- 10 2. The method of claim 1 wherein said microorganisms have exponential growth rates of from 5.5 to 8.5 doublings per day when grown under the following conditions: exponential phase of growth in M-5 media at 25°C in a flask on an orbital shaker.
- 15 3. The method of claim 1 wherein said microorganisms have exponential growth rates of from 6.6 to 8.5 doublings per day when grown under the following conditions: exponential phase of growth in M-5 media at 25°C in a flask on an orbital shaker.
- 20 4. The method of claim 1 wherein said conditions are achieved by inoculating a 250 ml flask having 50 ml of M-5 media adjusted to pH 7.0 with 1-2 ml of a culture having said microorganisms in exponential growth phase, and shaking said flask at 200 rpm on an orbital shaker for 22.75 hours.
- 25 5. The method of claim 1 wherein said conditions are achieved according to the method described in Example 5.
6. The method of claim 1 wherein about 20% or less of the total fatty acids in said lipids are omega-6 fatty acids.
- 30 7. The method of claim 1 wherein at least about 49% of the total fatty acids of said lipids are omega-3 fatty acids.

8. The method of claim 1 wherein the ratio of docosahexaenoic acid (DHA) to eicosapentaenoic acid (EPA) in said lipids is about 7.07 or less.

9. The method of claim 1 wherein at least about 64.5% of omega-3 fatty acids in said 5 lipids is DHA.

10. The method of claim 1 wherein at least about 86% of omega-3 fatty acids in said lipids is DHA.

10 11. The method of claim 1 wherein the ratio of EPA to DHA in said lipids is from about 1:1 to about 1:30.

12. The method of claim 1 wherein the ratio of DPA to DHA in said lipids is at least about 1:12.

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13. The method of claim 1 wherein the total fatty acid composition in said lipids comprises about 5% or less of C20:4w6 fatty acid.

14. The method of claim 1 wherein said lipids have a sterol content of at least about 20 0.1% ash-free dry weight.

15. The method of claim 1 wherein said lipids have a cholesterol content of at least about 15% of the total sterol content.

25 16. The method of claim 1 wherein said lipids have at least 7.8% by weight of total fatty acids as C20:5w3.

17. The method of claim 1 wherein said lipids have at least 68% by weight of total fatty acids as omega-3 fatty acids.

18. The method of claim 1 wherein said lipids have more than 25% by weight of total fatty acids as omega-6 fatty acids.
19. The method of claim 1 wherein said lipids have at least 94% by weight of total omega-3 fatty acids as C22:6n-3.
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20. The method of claim 1 wherein said lipids have at least 28% by weight of total omega-3 fatty acids as C20:5n-3.
- 10 21. The method of claim 1 wherein said lipids have at least 61% by weight of total fatty acids as C22:6n-3.

22. A method for producing lipids comprising:

- a) growing microorganisms of the order Thraustochytriales in a fermentation medium; and
- b) extracting lipids from said microorganisms,

5 wherein said microorganisms have exponential growth rates of at least about 6.0 doublings per day when grown under the following conditions: exponential phase of growth in M-5 media at 30°C in a flask on an orbital shaker.

23. The method of claim 22 wherein said microorganisms have exponential growth rates of from 6.0 to 9.4 doublings per day when grown under the following conditions: exponential phase of growth in M-5 media at 30°C in a flask on an orbital shaker.

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24. The method of claim 22 wherein said microorganisms have exponential growth rates of from 7.3 to 9.4 doublings per day when grown under the following conditions: exponential phase of growth in M-5 media at 30°C in a flask on an orbital shaker.

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25. The method of claim 22 wherein said conditions are achieved by inoculating a 250 ml flask having 50 ml of M-5 media adjusted to pH 7.0 with 1-2 ml of a culture having said microorganisms in exponential growth phase, and shaking said flask at 200 rpm on an orbital shaker for 22.75 hours.

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26. The method of claim 22 wherein said conditions are achieved according to the method described in Example 5.

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27. The method of claim 22 wherein about 20% or less of the total fatty acids in said lipids are omega-6 fatty acids.

28. The method of claim 22 wherein at least about 49% of the total fatty acids of said lipids are omega-3 fatty acids.

29. The method of claim 22 wherein the ratio of docosahexaenoic acid (DHA) to eicosapentaenoic acid (EPA) in said lipids is about 7.07 or less.

30. The method of claim 22 wherein at least about 64.5% of omega-3 fatty acids in said lipids is DHA.

5 31. The method of claim 22 wherein at least about 86% of omega-3 fatty acids in said lipids is DHA.

10 32. The method of claim 22 wherein the ratio of EPA to DHA in said lipids is from about 1:1 to about 1:30.

33. The method of claim 22 wherein the ratio of DPA to DHA in said lipids is at least about 1:12.

15 34. The method of claim 22 wherein the total fatty acid composition in said lipids comprises about 5% or less of C20:4w6 fatty acid.

35. The method of claim 22 wherein said lipids have a sterol content of at least about 20 0.1% ash-free dry weight.

36. The method of claim 22 wherein said lipids have a cholesterol content of at least about 15% of the total sterol content.

25 37. The method of claim 22 wherein said lipids have at least 7.8% by weight of total fatty acids as C20:5w3.

38. The method of claim 22 wherein said lipids have at least 68% by weight of total fatty acids as omega-3 fatty acids.

39. The method of claim 22 wherein said lipids have more than 25% by weight of total fatty acids as omega-6 fatty acids.

40. The method of claim 22 wherein said lipids have at least 94% by weight of total omega-3 fatty acids as C22:6n-3.

5 41. The method of claim 22 wherein said lipids have at least 28% by weight of total omega-3 fatty acids as C20:5n-3.

10 42. The method of claim 22 wherein said lipids have at least 61% by weight of total fatty acids as C22:6n-3.